CLAIMS

What is claimed is:

1. An alternator of a charging system comprising:

a rotor with a plurality of permanent magnets mounted to the inside surface of the sidewall of the rotor;

a stator mounted under the rotor, the stator including a central core with a plurality of poles extending radially outwardly from the periphery of the core, the poles each having a radially extending member extending outwardly from the central core and an end member located at the end of the radially extending member;

a plurality of windings wound around the radially extending member of the stator;

an air gap between the end members and the magnets to allow rotation of the rotor around the stator creating a magnetic field and inducing a current in the windings of the stator;

wherein each of the magnets have an arc length that is dependent on the flux needed for the desired output.

2. The alternator of claim 1 wherein the magnets are circumferentially arranged and magnetized in the radial direction with alternating north and south polarities.

3. The alternator of claim 1 wherein the magnets are affixed to the inside surface of the rotor sidewall by an adhesive or other fastening means.

4. The alternator of claim 1 wherein the windings include three wires wound around the stator poles for a three phase charging system.

5. The alternator of claim 4 wherein the windings include a first winding wound around every third pole, a second winding wound around the next open poles and a third winding wound around the last open poles.

6. The alternator of claim 1 wherein the increase in the number of magnet poles increases the frequency of the changing magnetic field which helps to limit the current to lower values at higher engine RPMs.

7. The alternator of claim 1 wherein the increase in the number of magnet poles allows for fewer windings on the stator.

8. The alternator of claim 7 wherein the fewer windings on the stator allows for larger wire gauges to be used in the manufacture of the stator, helping to reduce temperatures.

9. The alternator of claim 7 wherein the fewer windings on the stator allow the stator to be manufactured at a lower cost.

10. The alternator of claim 1 wherein the increase in the number of magnet poles allows for fewer windings on the stator.

11. The alternator of claim 1 wherein the increase in the number of magnet poles reduces peak currents in the stator.

12. The alternator of claim 10 wherein the reduced current prolongs the life of the connectors of the alternator.

13. The alternator of claim 1 wherein the increase in the number of magnet poles reduces the torque required to turn the rotor.

14. The alternator of claim 1 wherein the increase in the number of magnet poles results in lower operating temperatures of the alternator making the alternator more reliable.

15. The alternator of claim 1 wherein the increase in the number of magnet poles reduces the number of laminations of the stator when using rare earth magnets.

16. The alternator of claim 1 wherein the increase in the number of magnet poles can be done with all types of magnetic materials, including Ceramic, Neodymium, Samarium-Cobalt and Alnico.

17. The alternator of claim 1 wherein the stator is made from a plurality of steel laminations.

18. A permanent magnet charging system in which the output current can be limited by increasing the number of magnet pole pairs comprising:

a rotor with a plurality of permanent magnets mounted to the inside surface of the rotor;

a stator mounted under the rotor, the stator including a central core with a plurality of poles extending radially outwardly from the periphery of the core, the poles each having a radially extending member extending outwardly from the central core and an end member located at the end of the radially extending member;

a plurality of windings wound around the radially extending member of the stator, wherein a first winding is wound around every third pole, a second winding is wound around the next open poles and a third winding is wound around the last open poles;

an air gap between the end members and the magnets to allow rotation of the rotor around the stator creating a magnetic field and inducing a current in the windings of the stator; and

wherein each of the magnets have an arc length that is approximately equal to the length of the end members of the poles.

19. The charging system of claim 18 wherein the charging system can be incorporated into a plurality of different power equipment and vehicles which requires battery charging or electrical power generation.

20. A method for controlling or limiting the output charging current of a charging system, the method comprising the steps of:

mounting a stator under a rotor, the rotor having a plurality of permanent magnets mounted to an inside surface of a sidewall, the stator having a central core with a plurality of poles extending radially outwardly from the periphery of the core, the poles each having a radially extending member extending outwardly from the central core and an end member located at the end of the radially extending member;

winding at least one length of copper wire around plurality of windings around the radially extending members of the stator;

rotating the rotor around the stator to create a changing magnetic field and induce a current in the windings of the stator; and

increasing the number and reducing the size of the magnets to reduce the output charging current from the winding on the stator.